

Tomopterids (Polychaeta: Tomopteridae) of the Western Caribbean Sea

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Abstract

Tomopterid polychaetes were collected during five oceanographic cruises carried out off the eastern coast of the Yucatan Peninsula, western Caribbean Sea. Five species of the holoplanktic genus *Tomopteris* were recorded, increasing the number of *Tomopteris* species known from the Caribbean Sea to 7. The most common species in the area were *T. elegans* CHUN, 1888 and *T. nationalis* DALES, 1957. Together, they represented more than 83 % of the total tomopterid fauna. Diagnoses and illustrations are given here for the five species recorded, together an identification key for the Caribbean species of *Tomopteris*.

Key words: zooplankton, polychaetes, Tomopteridae, Mexico

Resumen

Se recolectaron poliquetos tomopterídos durante 5 cruceros oceanográficos realizados en el área oceánica frente a la costa oriental de la Península de Yucatán, en el mar Caribe occidental. Se registraron 5 especies del género holoplanktonico *Tomopteris*. Con ello se incrementa a 7 el número de especies de este género reconocidas para el mar Caribe. Las especies más comunes en el área fueron *T. elegans* CHUN, 1888 y *T. nationalis* DALES, 1957; juntas representaron más del 83 % del total de la fauna de tomopterídos. Se presentan diagnosis e ilustraciones para las 5 especies recolectadas así como una clave para la identificación de las especies de *Tomopteris* del Caribe.

Palabras clave: zooplancton, poliquetos, Tomopteridae, México

Introduction

Of the approximately 80 polychaete families that are recognized to date, only 8 are holoplanktic (STØP-BOWITZ, 1996). Of these, the Tomopteridae is one of the most specialized, bearing a well-developed set of anterior appendages, and membranous pinnules. Both features allow these zooplankters to have a better buoyancy control in the water column. Although not particularly abundant in the pelagic realm, tomopterids are commonly collected during plankton trawls at various depths.

To date, only 36 tomopterid species have been described (FAUCHALD, 1977; STØP-BOWITZ, 1992, 1996) and little

is known about their biology. Most of them are regarded as active predators of other zooplankters including siphonophores, chaetognaths, salps, fish larvae (ÅKESSON, 1962; RAKUSA-SUSZCZEWSKI, 1968; HARTMANN-SCHRÖDER, 1971), and even other tomopterids (MCINTOSH, 1921). Some species have been recognized as indicators of hydrographic conditions or of specific water masses. For example, *Tomopteris carpenteri* QUATREFAGES, 1865 is restricted to the southern zone of the Subtropical Convergence (DAY, 1967), *T. eucheta* CHUN, 1888 is related to warm waters in the Southwestern Atlantic (STØP-BOWITZ, 1948; RAMÍREZ, 1977), and *T. septentrionalis* QUATREFAGES, 1866 and *T. planktonis* APSTEIN, 1900 indicate seasonal inflow of cold waters in the Argentinian shelf (RAMÍREZ, 1977).

Records of tomopterids in the Atlantic Ocean are rather scarce (TEBBLE, 1960; DAY, 1967; ORENSANZ & RAMÍREZ, 1973; STØP-BOWITZ, 1948; 1992), only 29 tomopterid species have been reported. In the Northwestern Tropical Atlantic, and particularly in the Caribbean Sea, records are limited to 4 species only, as stated by ROSA (1908) and SALAZAR-VALLEJO (1996). In the present work, we report on the tomopterid polychaetes recorded during several oceanographic cruises carried out off the Mexican coasts in the Caribbean Sea during 1991. An illustrated identification key and brief diagnoses of the species recorded are also presented herein.

Methods

Five oceanographic cruises were carried out off the Mexican coasts in the Caribbean Sea during February, March, May, August, and November 1991, using vessels of the Mexican Secretaría de Marina. Zooplankton samples were collected at 22 oceanic stations during each cruise (Fig. 1). Surface (0-10 m) trawls with a standard plankton net (0.33 mm mesh) allowed collection of large and middle-sized pelagic polychaetes. Temperature and salinity were recorded at each sampling site. The mean volume of water filtered by the net during each haul was ca. 160 m³. Samples were collected both, in daylight (06:00-18:00 h) and during the night (19:00-05:00 h). Samples were fixed and preserved in a buffered 4% formalin solution. Tomopteriids were

Table 1 – Mean density (ind./1000 m³) and relative abundance (%) of tomopteriid species during each of five CARIBE cruises off the Mexican Caribbean Sea (1991).

	CARIBE I February		CARIBE II March		CARIBE III May		CARIBE IV August		CARIBE V November	
	Density	%	Density	%	Density	%	Density	%	Density	%
<i>T. elegans</i> Chun, 1988	4.48	87.15	1.60	7.57	5.49	89.55	0.46	19.91	3.03	100
<i>T. nationalis</i> Apstein, 1900	0.33	6.42	0.28	1.32			1.39	60.17		
<i>T. nisseni</i> Rosa, 1908					0.46	19.91				
<i>T. planktonis</i> Apstein, 1900		19.23	91.09							
<i>T. septentrionalis</i> Steenstrup	0.33	6.42	0.31	1.46	0.64	10.44				
overall density	0.22		1.26		0.306		0.128		0.378	
Number of species	3		4		2		3		1	

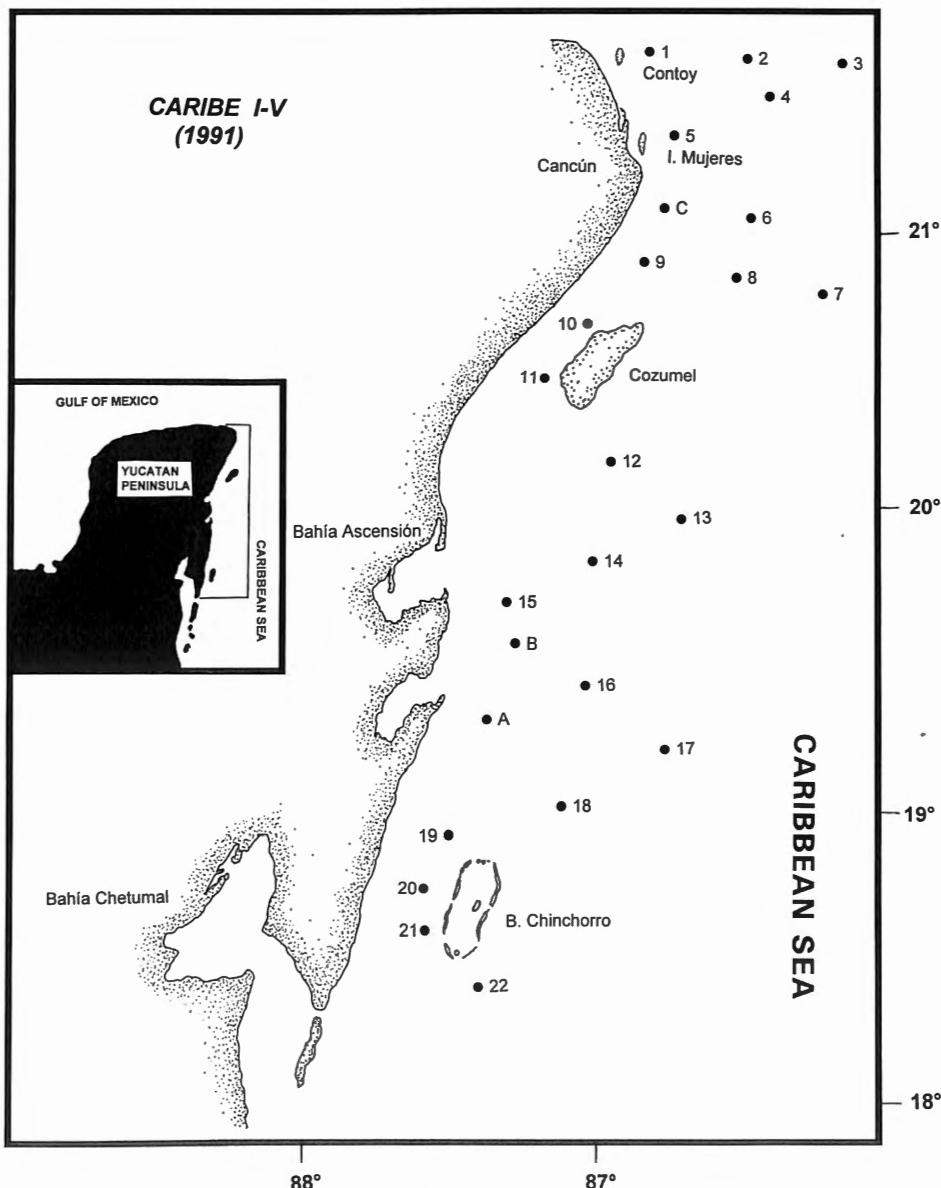


Fig. 1. – Surveyed area with zooplankton sampling stations off the Mexican coast of the Caribbean Sea during the CARIBE I-IV cruises (1991).

identified using DAY (1967) and STØP-BOWITZ (1996), among other works. Specimens were deposited in the ECOSUR collection of zooplankton (ECO-CHZ), at Chetumal, Mexico. Confirmed specimens from the National Museum of Natural History (USNN) was requested in order to compare it with the Caribbean specimens.

Results

DISTRIBUTION AND ABUNDANCE

Tomopterids were recorded during the five cruises, with variable, low densities in all cases. They were most abundant in May (0.306 ind./1000 m³), and scarcest in August (0.128 org./1000 m³) (Table 1). The overall distribution of the genus included mainly the northern and central parts of the surveyed area. The most common species was *T. elegans*, collected during all the cruises; its density varied between 5.49 ind./1000 m³ in May and 0.46 ind./1000 m³ in August. *Tomopteris elegans* and *T. nationalis* accounted for nearly 85 % of the total tomopterid fauna. Some species, such as *T. planktonis* and *T. nisseni* were collected during one cruise only (Fig. 2).

SYSTEMATIC DESCRIPTIONS

In this section, a brief taxonomic diagnosis of the genus *Tomopteris* is presented, followed by diagnoses, illustrations and a dichotomic identification key for each of the

5 species considered herein. The section 'material examined' indicates the cruise (CI-V), station number (E), the number of specimens analyzed, and the catalogue number.

Class Polychaeta GRUBE, 1851
Order Phyllodocidae (LIVANOV, 1940)
Suborder Phyllodociformia (LEVINSEN, 1882)
Family Tomopteridae GRUBE, 1848
Tomopteris ESCHSCHOLTZ, 1825

Prostomium fused with first two segments. One pair of plane, divergent antennae, a pair of poorly developed eyes and two nuchal organs. First free segment with a pair of appendages, well-developed in juveniles and reduced or absent in adults. Second free segment with a pair of very long appendages, frequently longer than the body. Proboscis short, unarmed. Parapodia biramous, without setae. In some species, last parapodia reduced, forming a tail. Gonads always on dorsal ramus, sometimes also ventral. Parapodial rami bordered by membranous pinnules with different types of glands, the latter representing key characters for species identification. These glands are: A) Chromophile glands, formed by groups of hyaline or yellowish convergent tubes, large and conspicuous, only on ventral pinnules from the first through the fifth segments. Some species with additional glands (spur glands) on distal portion of chromophile glands, forming a spur projection from edge of pinnule. B) Hyaline glands, formed by meridian tubes converging into a red or brown pigmented center, they are small and inconspicuous located

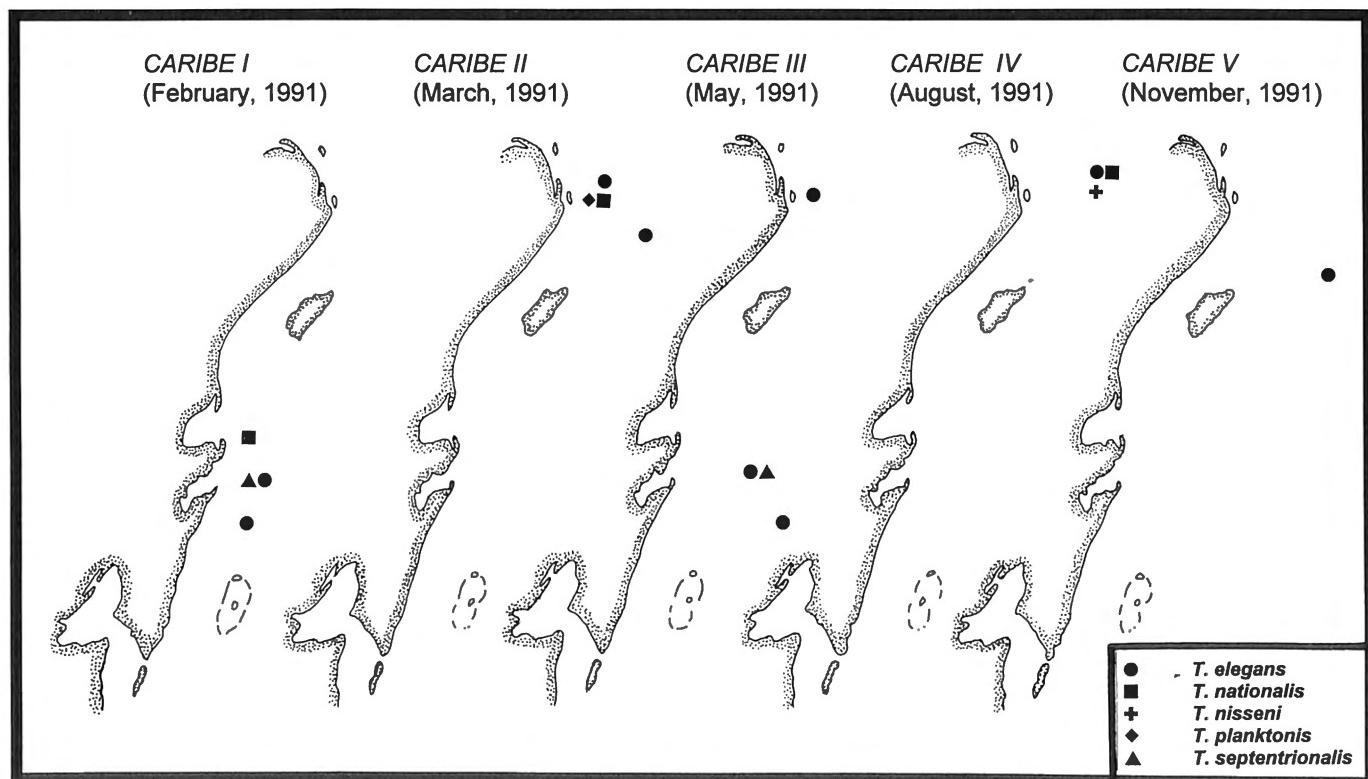


Fig. 2. – Distribution of the species of tomopterids collected during the surveyed period in the Mexican Caribbean Sea.

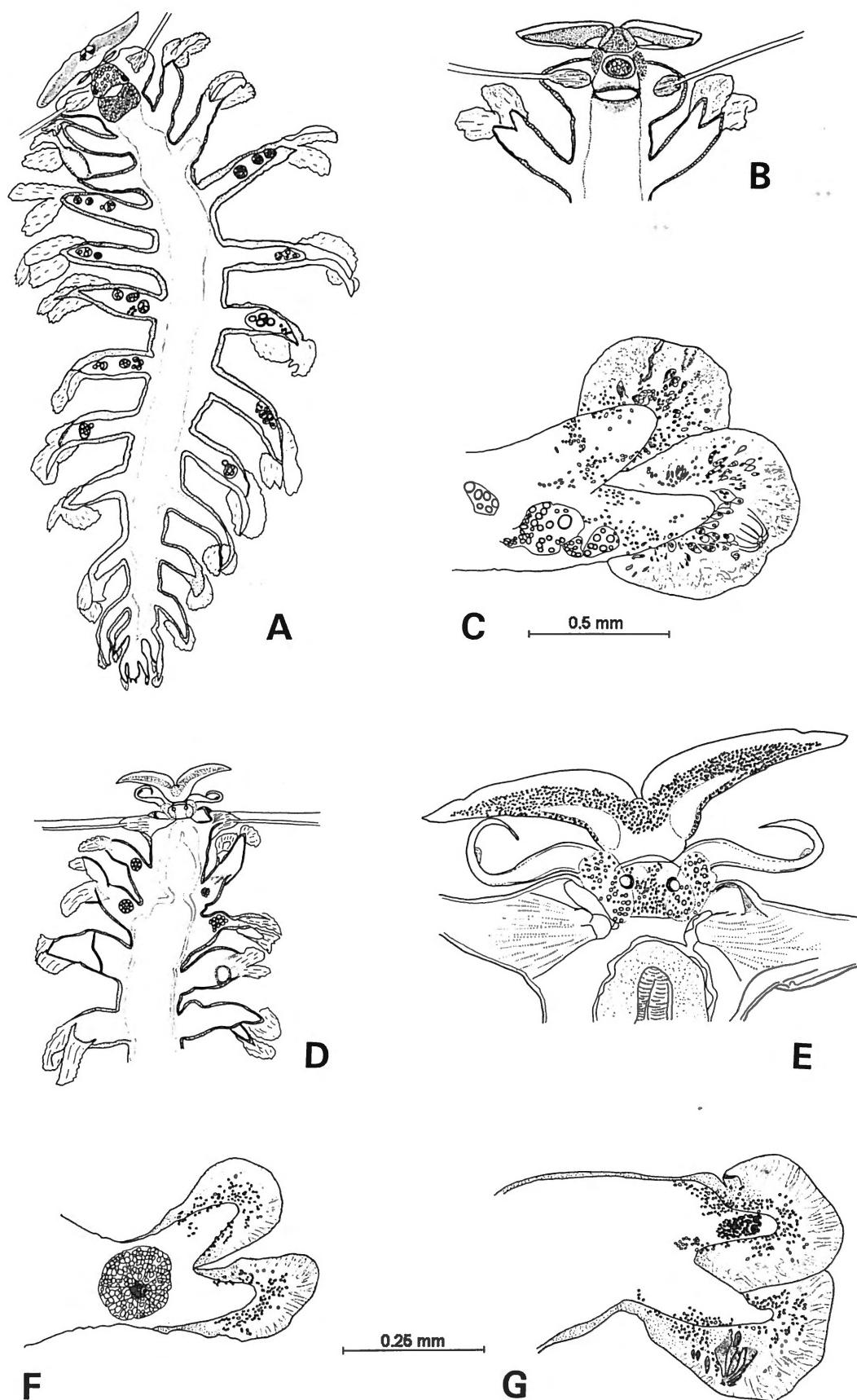


Fig. 3. – *Tomopteris elegans*: A, habitus, ventral view; B, anterior region, dorsal view; C, third foot. *Tomopteris nationalis*: D, anterior region, dorsal view; E, details of anterior region, F, first foot; G, fifth foot.

on dorsal pinnules of segments 3 and 4 or on the apical portion of ventral pinnules. C) Rosette glands, formed by gland cells grouped in a rosette, with a yellowish or reddish center, small and bioluminescent (USHAKOV, 1972), commonly located on parapodial trunk of first two parapodia or on both parapodial pinnules, near the apex of rami.

***Tomopteris elegans* CHUN, 1888**
(Fig. 3, A,B,C)

REFERENCES

CHUN, 1888:18; FAUVEL, 1923:223; CAROLI, 1928:17; FAUVEL, 1953:142; DALES, 1957:142; DAY, 1967:205; USHAKOV, 1972:206; STØP-BOWITZ, 1992:83.

Tomopteris kefersteinii : FAUVEL, 1923:225; TERIO, 1947:213 (non GREFF, 1879a: 275).

Tomopteris carolii TERIO, 1947:216.

MATERIAL EXAMINED

CIEB (9), ECO-CHZ-00472; CIEA (4), ECO-CHZ-00473; CIIE5 (1), ECO-CHZ-00474; CIIE6 (4), ECO-CHZ-00492; CIIE5 (2), ECO-CHZ-00475; CIIE5 (6), ECO-CHZ-00476; CIIE16 (5), ECO-CHZ-00477; CIIE17 (1), ECO-CHZ-00478; CIVE4 (1), ECO-CHZ-00479; CVE7 (5), ECO-CHZ-00480. USNM-35556 (3); USNM- 39574 (6).

DIAGNOSIS

Size 1.5-5.4 mm length, 1.0 mm width. Number of parapodia: 8-13. Prostomium with a pair of poorly developed, pigmented red eyes (Fig. 3A). Nuchal organs well developed. Prostomial antennae long and wide, with a clear central notch (Fig. 3B). First cirriform appendage shorter than the antennae, always present. Second cirriform appendage 2/3 the body length, broken in most specimens examined. Parapodia quite long and slender, including the first pair. Chromophile glands from the fourth parapodium, undifferentiated in most of our specimens. Hyaline glands only on parapodia 3 and 4 (Fig. 3C). Gonads present only on parapodia 3-8. The only adult specimen collected with gametes all along the body, most specimens being juveniles, without developed gonads.

TYPE LOCALITY

Canary Islands.

DISTRIBUTION

North and South Atlantic, North Pacific, Indian Ocean. Mediterranean. Not previously recorded in the Mexican Caribbean.

***Tomopteris nationalis* APSTEIN, 1900**
(Fig. 3, D,E,F,G)

REFERENCES

APSTEIN, 1900:41; DALES, 1957:139; DALES & PETER, 1972:74; DAY, 1967:198-204; DAY, 1975:210; FERNÁNDEZ-ALAMO, 1983:173.

MATERIAL EXAMINED

CIE15 (1), ECO-CHZ-00481; CIIE5 (1), ECO-CHZ-00482; CIVE4 (1), ECO-CHZ-00483; CIVE4 (2), ECO-CHZ-00484.

DIAGNOSIS

Size: 2.5-4.0 mm length, 1-1.15 mm width. Number of parapodia: 12 in all the specimens examined. Prostomial antennae sturdy, with a strong central notch (Fig. 3D). First cirriform appendage as long or longer than the antennae, with a small lamella on distal section (Fig. 3E). Second cirriform appendage equal to body length. Prostomium with a pair of lenticulated eyes, dorsal surface of prostomium with two rounded hyaline structures. Nuchal organs well developed. Parapodia robust and long, wider than the body. Rosette glands on the trunk of first and second parapodia (Fig. 3F). Chromophile glands from the third to the last parapodium (Fig. 3G). No spur glands observed on our specimens. Gonads from the second to the last parapodia.

TYPE LOCALITY

Naples (Italy)

DISTRIBUTION

Tropical water of Atlantic and Pacific Oceans. Mediterranean. Not previously recorded from the tropical Northwestern Atlantic.

***Tomopteris nisseni* ROSA, 1908**
(Fig. 4,A,B,C,D)

REFERENCES

ROSA, 1908a:1; DALES, 1955:440; DALES, 1957:141; DALES, 1958: 485; DALES, 1963:503; DALES & PETER, 1972:76; FAUVEL, 1923:222; HARTMAN, 1968:351; STØP-BOWITZ, 1992:75.

Briareus scolopendra QUOY et GAIMARD, 1826:193

Briaræa scolopendra QUOY et GAIMARD, 1827:235 (non *Tomopteris scolopendra* KEFERSTEIN, 1861).

Tomopteris briarea QUATREFAGES, 1866:226.

Tomopteris Nisseni ROSA, 1908a:1; 1908b:292- FAUVEL, 1923:222.

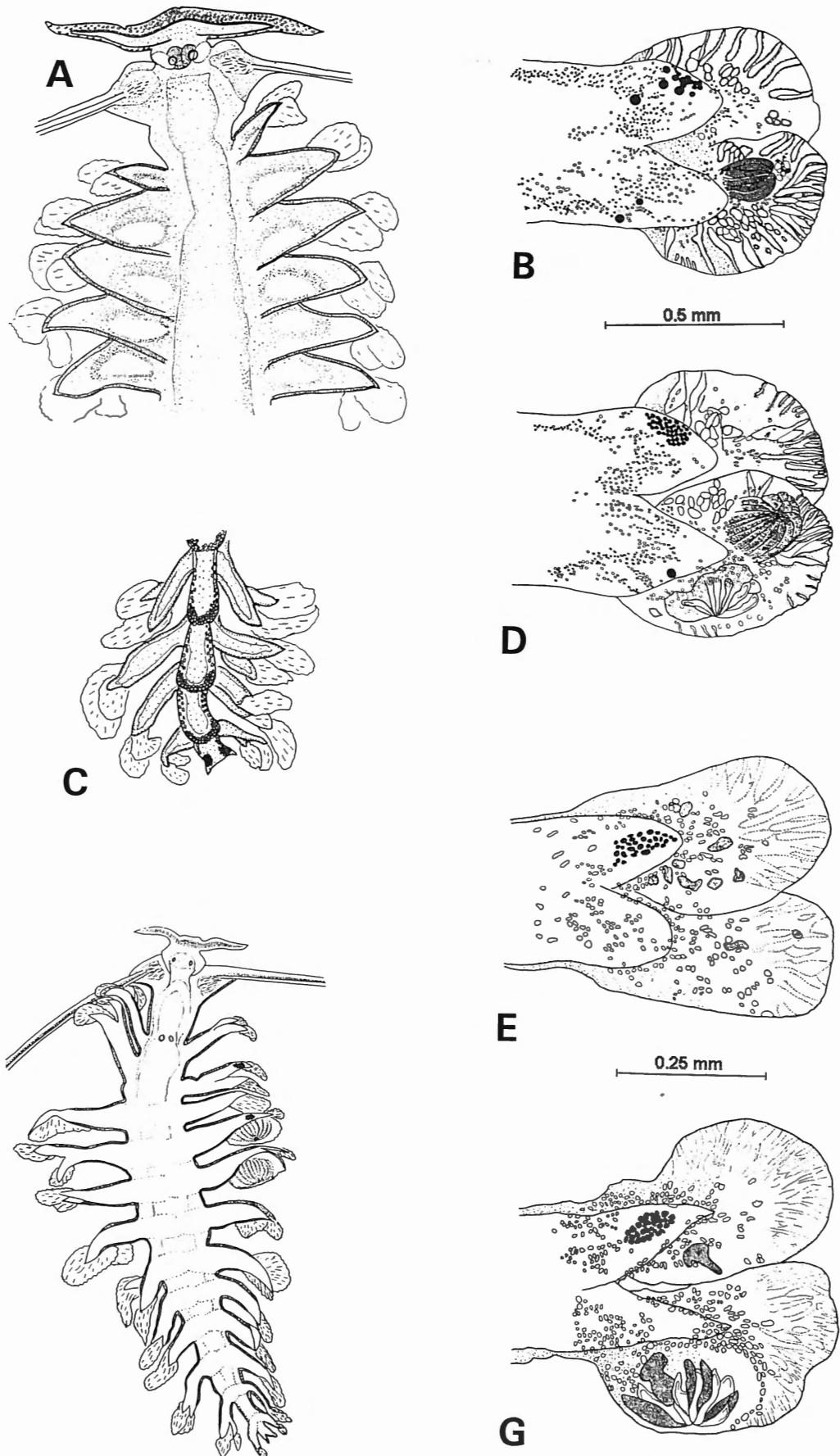


Fig. 4. – *Tomopteris nisseni*: A, anterior region, dorsal view; B, third foot; C, tail end; D, fourth foot. *Tomopteris planktonis*: E, third foot; F, anterior region, dorsal view; G, fifth foot.

- (?) *Tomopteris innatans* CHAMBERLIN, 1919:159.
 (?) *Tomopteris idiura* CHAMBERLIN, 1919:161.
Tomopteris opaca TREADWELL, 1928:463.
Tomopteris longisetis TREADWELL, 1936:58.
Tomopteris euchaeta DAY, 1967:202

MATERIAL EXAMINED

CIVE4(1), ECO-CHZ-00485.

DIAGNOSIS

Size 5.5 mm length, 2.0 mm width. Number of parapodia: 20, including 4 reduced parapodia forming a short tail (Fig. 4C). Prostomium with a pair of lenticulated eyes. Nuchal organs well developed. Prostomial antennae long and wide, without central notch. First cirriform appendage absent (Fig. 4A). Second cirriform appendage with a stout acicule, broken in our material but at least as large as the body. First three pairs of parapodia with some tubules on dorsal pinnules, appearing as those of chromophile glands, but distributed irregularly (Fig. 4E). Chromophile glands from parapodia 4-8, noticeably compact on parapodia 4 and 5 (Fig. 4G) not present on analyzed specimens, but reported in other surveys, as located on ventral pinnules from the first parapodia (FAUVEL, 1923). Gonads present from parapodium 2 to 9-10. Red spots scattered on the surface of all the specimens.

TYPE LOCALITY

North Atlantic Ocean

DISTRIBUTION

Atlantic, Indo-Pacific, Mediterranean. Not previously recorded in the Mexican Caribbean.

Tomopteris planktonis APSTEIN, 1900
 (Fig. 4, E,F,G)

REFERENCES

- APSTEIN, 1900:42; CAROLI, 1928:18; DALES, 1963:503; DALES & PETER, 1972:75; DAY, 1967:206; FAUVEL, 1923:224; FERNÁNDEZ-ALAMO, 1983:166-170; LANA & BLANKENSTEYN, 1986:15; ORENSANZ & RAMÍREZ, 1973:67; ROZBACZYLO *et al.*, 1987:107; STØP-BOWITZ, 1949:13; STØP-BOWITZ, 1951:9; STØP-BOWITZ, 1977:11; STØP-BOWITZ, 1992:88.

Tomopteris cavallii: DALES, 1957a:144, figs. 51b, 52b.

MATERIAL EXAMINED

C11E5(2), ECO-CHZ-OO486; C11E5(2), ECO-CHZ-OO487: USNM-34515(3); USNM-32497(2); USNM-34525(3); USNM-34551(5); USNM-34513(1).

DIAGNOSIS

Size 1.5-2.5 mm length, 0.8-1.5 mm width. Number of parapodia: 12 in two specimens and 10 in the two other. Prostomium with a pair of pigmented eyes, reddish. Nuchal organs well-developed. Prostomial antennae long and wide, without central notch. First cirriform appendage absent (Fig. 4F). Second cirriform appendage with a stout acicule, broken in our material but at least as large as the body. First three pairs of parapodia with some tubules on dorsal pinnules, appearing as those of chromophile glands, but distributed irregularly (Fig. 4E). Chromophile glands from parapodia 4-8, noticeably compact on parapodia 4 and 5 (Fig. 4G) not present on analyzed specimens, but reported in other surveys, as located on ventral pinnules from the first parapodia (FAUVEL, 1923). Gonads present from parapodium 2 to 9-10. Red spots scattered on the surface of all the specimens.

TYPE LOCALITY

North and Central Atlantic.

DISTRIBUTION

Cosmopolitan: Atlantic, Antarctic, Indo-Pacific, Mediterranean. Not previously recorded from the tropical Northwestern Atlantic.

Tomopteris septentrionalis QUATREFAGES, 1866
 (Fig. 5, A,B,C,D)

REFERENCES

- QUATREFAGES, 1866; BENHAM, 1929:195; DALES, 1955:440; DALES, 1957:145; DALES & PETER, 1972:72; DAY, 1967:205; FAUVEL, 1923:224; FERNÁNDEZ-ALAMO, 1983:166-169; HARTMAN, 1968:355; ORENSANZ & RAMÍREZ, 1973:65; PETTIBONE, 1963:97; ROZBACZYLO *et al.*, 1987:108; STØP-BOWITZ, 1949:12; STØP-BOWITZ, 1951:9; STØP-BOWITZ, 1977:11; STØP-BOWITZ, 1992:86; SUN & WU, 1979:67; TREADWELL, 1943:39; USHAKOV, 1972:205.

MATERIAL EXAMINED

CIEB (1), ECO-CHZ-00488; CIIE21 (1), ECO-CHZ-00489; CIIE16(1), ECO-CHZ-00490; CIIE16 (1), ECO-CHZ-00491. USNM-32497(2); USNM-34551 (3); USNM-34525(3); USNM-34551(5); USNM-34513(1).

DIAGNOSIS

Size 2.3 mm length, 1.0 mm width. Number of parapodia: 11 in three specimens and 12 in the other. Prostomium short, with a pair of eyes. Nuchal organs well developed (Fig. 5A). Prostomial antennae long and wide, with a deep central notch; this feature not seen clearly in our specimens, most of them damaged. First cirriform appendage absent. Second cirriform appendage longer than the body: actual

length of these appendages not determined in our material, but observed in specimens loaned by the National Museum of Natural History (holotype USNM32497). One rounded hyaline structure on each parapodial trunk of the first pair of parapodia observed in our specimens (Fig. 5B). Chromophile glands undifferentiated. Hyaline glands from the second parapodium (Fig. 5D). Gonads present in parapodia 2 to 8 (Fig 5C, D).

LOCALITY

Danish seas

DISTRIBUTION

Cosmopolitan: Atlantic, Indo-Pacific, Mediterranean. Not previously recorded from the tropical Northwestern Atlantic.

REMARKS

Actual length of these cirriform appendages not determined in our material, but observed in specimens loaned by the National Museum of Natural History, particularly in USNM32497.

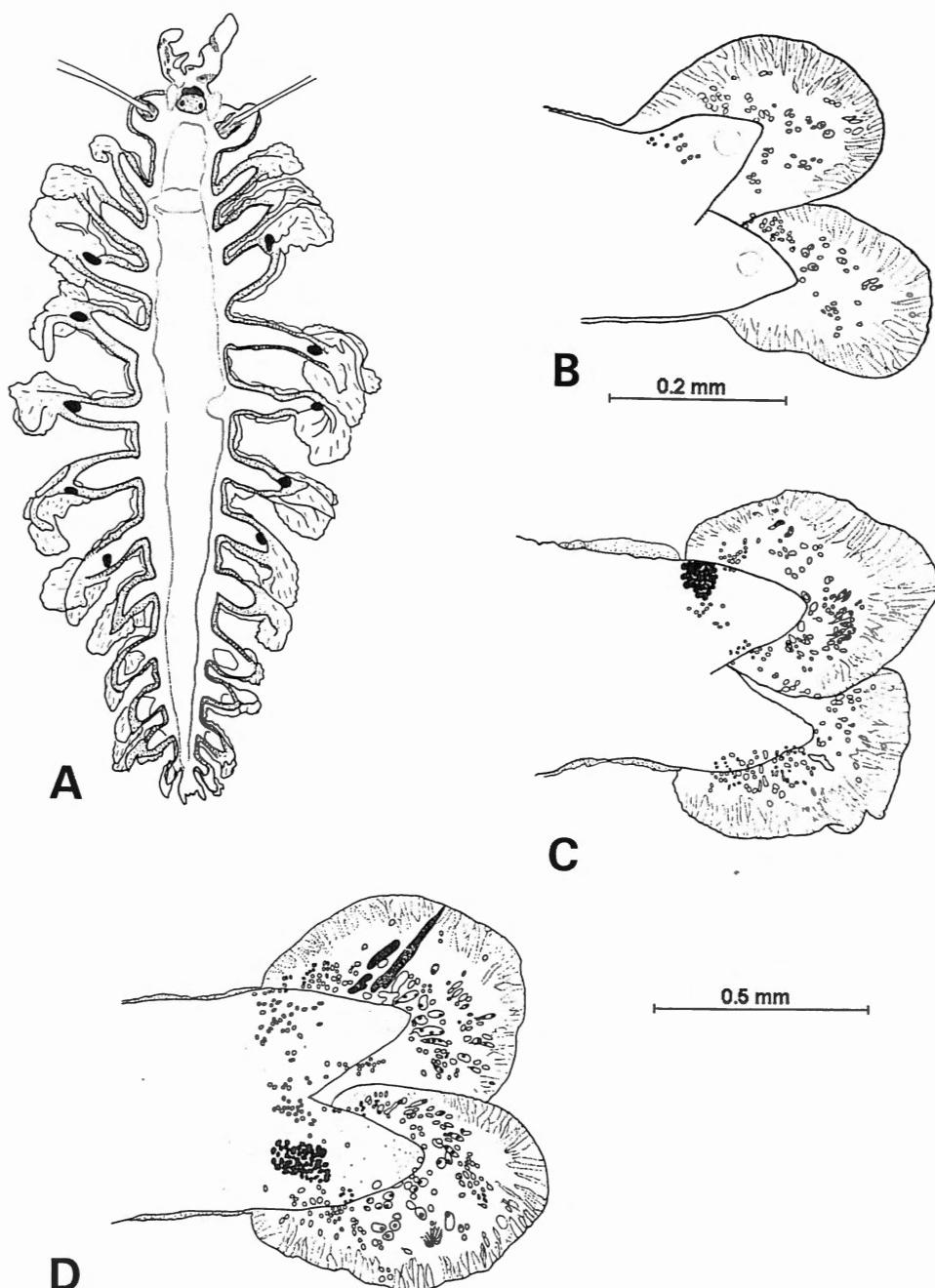


Fig. 5. – *Tomopteris septentrionalis*: A, anterior region, dorsal view; B, first foot; C, third foot; D, fourth foot.

Identification key for the Caribbean species of *Tomopteris*

1 A. Rosette glands present	2
1 B. Rosette gland absent	3
2 A. Rosette glands on the parapodial trunks of the first two pairs of parapodia. Chromophyle gland from third pair of parapodia	<i>T. nationalis</i>
2 B. Rosette glands on the first two pairs of parapodia. Chromophyle glands from first or second pairs of parapodia ...	<i>T. helgolandica</i>
3 A. Hyaline glands from first or second pairs of parapodia	4
3 B. Hyaline glands from third or fourth pair of parapodia	5
4 A. Hyaline glands from first pair of parapodia	<i>T. ligulata</i>
4 B. Hyaline glands from second pair of parapodia	<i>T. septentrionalis</i>
5 A. Hyaline glands very large from third pair of parapodia	<i>T. nisseni</i>
5 B. Hyaline glands in third and fourth pairs of parapodia only	<i>T. elegans</i>
5 C. Hyaline glands from first pair of parapodia	<i>T. planktonis</i>

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